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10/585,451

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EXAMINER

WASAFF, JOHN SAMUEL

ART UNIT

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3742

NOTIFICATION DATE

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ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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| | | | |
|------------------------------|--------------------------------------|--------------------------------------|--|
| Office Action Summary | Application No. 10/585,451 | Applicant(s) ATSUMI ET AL. | |
| | Examiner JOHN WASAFF | Art Unit 3742 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-22 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 May 2007 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____. |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date ____. | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

2. Claims 1-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
3. Claim 1, line 3 recites "forming a modified region within the object." It is unclear what applicant means by such statement. Appropriate correction and/or clarification are required.
4. Claim 1, lines 5-6 and 7-8 recites "a/the displacement of a main surface." It is unclear what reference point applicant is using to measure the displacement (i.e., measuring a displacement of a main surface with respect to what?). Appropriate correction is required.
5. Claim 3, line 6 recites "a first measurement step," yet does not proceed to describe any measurement step taking place. Appropriate correction and/or clarification are required.
6. Claim 8, line 3 recites "forming a modified region within the object." It is unclear what applicant means by such statement. Appropriate correction and/or clarification are required.
7. Claim 8, lines 5-6, 7-8, and 18 recite "the displacement of a/the main surface of the object." It is unclear what reference point applicant is using to measure the displacement. Appropriate correction is required.

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

9. Claims 1-22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fukuyo et al. (EP1338371A1) in view of Kurosawa et al. (US Patent No. 5,463,202).

10. In claim 1, Fukuyo teaches a laser processing method for irradiating an object to be processed with a first laser beam (laser beam machining method and apparatus; see title) while converging the first laser beam with a lens such that a converging point is positioned within the object (object 1 is irradiated with laser light L while locating a light-converging point P within the object 1; para. [0120]), and forming a modified region within the object along a line to cut in the object (modified region 7 formed within object 1 along line to cut 5; para. [0120]); the method comprising: a displacement acquiring step of irradiating the object with a second light for measuring a displacement of a main surface of the object while converging the second light with the lens (imaging data processor 125 acquires displacement of main surface by reflected light from observation light source 117; para. [0143]), and acquiring the displacement of the main surface along the line to cut while detecting reflected light reflected by the main surface in response to the irradiation (imaging data processor 125 acquires displacement of main surface; para. [0144], [0145]); and a processing step of emitting the first laser beam and moving the lens and the object relative to each other along the main surface while adjusting a gap between the lens and the main surface according to the acquired displacement, so as to form the modified

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region along the line to cut (overall controller 127 controls movement of Z-axis stage via stage controller 115, thereby moving lens 105 and object 1 relative to each other and forming a modified region along line to be cut; para. [0150], [0151]).

11. In claim 2, Fukuyo teaches the displacement of the main surface along the line to cut is acquired at a first time interval while moving the lens and the object relative to each other at a first speed along the main surface in the displacement acquiring step; and wherein the modified region is formed while moving the lens and the object relative to each other at a second speed faster than the first speed along the main surface and adjusting the gap between the lens and the main surface at a second time interval shorter than the first time interval in the processing step (combination calculating section 151 of overall controller 127 sends calculated data to the stage controller 115, which adjusts the stages 109, 111 so as to attain the calculated magnitude of stage moving speed; para. [0304]).

12. In claim 3, Fukuyo teaches the displacement acquiring step comprises: a measurement preparatory step of holding the lens at a measurement initial position set such that a converging point of the second light is located at a predetermined position with respect to the object (select laser light source, i.e., hold lens at initial position, S101; Fig. 15); a first measurement step of starting emitting the second light while holding the lens at the measurement initial position (illuminate object, S105; Fig. 15), moving the lens and the object relative to each other along the main surface, and releasing the lens from being held at the measurement initial position in response to reflected light of the second light reflected by the main surface (move object in z-axis direction to position focal point of visible light from observation light source, S109; Fig. 15); and a second measurement step of adjusting the gap between the lens and the main surface

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after the release while detecting the reflected light of the second light reflected by the main surface, so as to acquire the displacement of the main surface along the line to cut (move object in z-axis in direction where light-converging point of laser light is located within object, S111; Fig. 15).

13. In claim 4, Fukuyo teaches the processing step comprises: a processing preparatory step of setting a processing initial position for holding the lens with respect to the main surface according to the displacement of the main surface along the line to cut acquired by the displacement acquiring step, and holding the lens at thus set processing initial position ((select laser light source, i.e., hold lens at initial position, S101; Fig. 15); a first processing step of starting emitting the first laser beam while holding the lens at the processing initial position, and moving the lens and the object relative to each other so as to form the modified region in one end part of the line to cut (move object in z-axis direction to position focal point of visible light from observation light source, S109; Fig. 15); and a second processing step of releasing the lens from being held at the processing initial position after forming the modified region in the one end part of the line to cut, and moving the lens and the object relative to each other after the release while adjusting the gap between the lens and the main surface according to the displacement of the main surface along the line to cut acquired in the displacement acquiring step, so as to form the modified region (move object in z-axis in direction where light-converging point of laser light is located within object, S111; Fig. 15).

14. In claim 5, Fukuyo teaches in the displacement acquiring step, the first laser beam is emitted when acquiring the displacement of the main surface along the line to cut, so as to form

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the modified region along the line to cut (laser source 101 emitted during displacement to form a modified region along line to be cut; para. [0150], [0151]).

15. In claim 6, Fukuyo teaches the modified region formed in the displacement acquiring step is formed between the modified region formed in the processing step and the main surface (modified region formed between modified region formed in processing step and main surface 3; para. [0152]).

16. In claims 7, 17-18, Fukuyo teaches the line to cut includes a first line to cut, wherein the displacement acquiring step moves the lens relative to the object in a first direction extending along the first line to cut, so as to acquire the displacement of the main surface along the first line to cut, and then moves the lens relative to the object in a second direction opposite from the first direction (imaging data processor 125 connects to overall controller 127, which moves Z-axis stage 113 via stage controller 115; para. [0150]); and wherein the processing step forms the modified region along the first line to cut in the first direction (modified region form along region to be cut; para. [0152]).

17. In claim 8, Fukuyo teaches a laser processing apparatus for irradiating an object to be processed with a first laser beam (laser beam machining method and apparatus; see title) while converging the first laser beam with a lens such that a converging point is positioned within the object (object 1 is irradiated with laser light L while locating a light-converging point P with in the object 1; para. [0120]), and forming a modified region within the object along a line to cut in the object (modified region 7 formed within object 1 along line to cut 5; para. [0120]); the apparatus comprising: a lens for converging the first laser beam (light converging lens 105) and a second light for measuring a displacement of a main surface of the object onto the object

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(observation light source 117; para. [0142]); displacement acquiring means for acquiring the displacement of the main surface of the object by detecting reflected light reflected by the main surface in response to irradiation with the second light (imaging data processor 125 acquires displacement of main surface by reflected light; para. [0143], [0144]); moving means for moving the object and the lens relative to each other along the main surface of the object (stage controller 115; para. [0144]); holding means for holding the lens such that the lens freely advances and retracts with respect to the main surface (focus adjustment of laser light L may be effected by moving the light-converging lens 105 in the optical axis direction of laser light L; para. [0182]); and control means for controlling respective behaviors of the moving means and holding means (overall controller 127; para. [0144]); wherein, while emitting the second light, the control means controls the moving means so as to move the object and the lens relative to each other along the main surface (observation light source 117 emits light, which is processed by imaging data processor 125 and used by overall controller 127 to regulate and stage controller 115; para. [0145]), the displacement acquiring means acquiring the displacement of the main surface along the line to cut (imaging data processor 125 acquires displacement of main surface; para. [0144], [0145]); and wherein, while emitting the first laser beam, the control means controls the holding means so as to hold the lens while adjusting a gap between the lens and the main surface according to the displacement acquired by the displacement acquiring means, and controls the moving means so as to move the lens and the object relative to each other along the main surface, thereby forming the modified region (overall controller 127 controls movement of Z-axis stage via stage controller 115, thereby moving lens 105 and object 1 relative to each other and forming a modified region; para. [0150], [0151]).

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18. In claim 9, Fukuyo teaches while emitting the second light, the control means controls the moving means so as to move the object and the lens relative to each other along the main surface at a first speed, the displacement acquiring means acquiring the displacement of the main surface along the line to cut at a first time interval; and wherein, while emitting the first laser beam, the control means controls the moving means so as to move the lens and the object relative to each other along the main surface at a second speed faster than the first speed, and controls the holding means so as to adjust the gap between the lens and the main surface at a second time interval shorter than the first time interval (combination calculating section 151 of overall controller 127 sends calculated data to the stage controller 115, which adjusts the stages 109, 111 so as to attain the calculated magnitude of stage moving speed; para. [0304]).

19. In claim 10, Fukuyo teaches the control means controls the holding means so as to hold the lens at a measurement initial position set such that a converging point of the second light is located at a predetermined position with respect to the object (select laser light source, i.e., hold lens at initial position, S101; Fig. 15); wherein while starting the emission of the second light with the lens being held at the measurement initial position, the control means controls the moving means so as to move the lens and the object relative to each other along the main surface, and controls the holding means so as to release the lens from being held at the measurement initial position in response to the reflected light of the second light reflected by the main surface (move object in z-axis direction to position focal point of visible light from observation light source, S109; Fig. 15); and wherein, after the release, the control means controls the holding means so as to adjust the gap between the lens and the main surface while detecting the reflected light of the second light reflected by the main surface, the displacement

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acquiring means acquiring the displacement of the main surface along the line to cut (move object in z-axis in direction where light-converging point of laser light is located within object, S111; Fig. 15).

20. In claims 11 and 20, Fukuyo teaches the control means controls the holding means so as to set a processing initial position for holding the lens with respect to the main surface according to the displacement of the main surface along the line to cut acquired by the displacement acquiring means, and hold the lens at thus set processing initial position (select laser light source, i.e., hold lens at initial position, S101; Fig. 15); wherein, while starting the emission of the first laser beam with the lens being held at the processing initial position, the control means controls the moving means so as to move the lens and the object relative to each other, thereby forming the modified region in one end part of the line to cut (move object in z-axis direction to position focal point of visible light from observation light source, S109, and then proceed to cut, S115; Fig. 15); and wherein, after forming the modified region in the one end part, the control means controls the holding means so as to release the lens from being held at the processing initial position and adjust the gap between the lens and the object according to the displacement of the main surface acquired by the displacement acquiring means, and controls the moving means so as to move the lens and the object relative to each other, thereby forming the modified region (move object in z-axis in direction where light-converging point of laser light is located within object, S111; Fig. 15).

21. In claim 12, Fukuyo teaches the displacement acquiring means emits the first laser beam when acquiring the displacement of the main surface, so as to form the modified region along the line to cut (imaging data processor 125 acquires displacement of main surface by reflected light,

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which is fed into overall controller 127, which controls laser light source 101; para. [0143], [0144]).

22. In claim 13, Fukuyo teaches the moving means is adapted to move the object toward the lens (stage controller 115; para. [0144]); and wherein the control means controls the moving means such that the modified region formed along the line to cut when the displacement acquiring means acquires the displacement is formed between the modified region formed later along the line to cut and the main surface (stage controller 115 controlled by overall controller 127, which receives data from image data processor 125; para. [0145]).

23. In claims 14, 21-22, Fukuyo teaches the line to cut includes a first line (first line to be cut described in para. [0105]); wherein the control means controls the moving means so as to move the lens relative to the object in a first direction along the first line to cut (overall controller 127 controls stage controller 115; para. [0145]), while the displacement acquiring means acquires the displacement of the main surface along the first line to cut (image data processor 125 acquires displacement of main surface; para. [0144]), and then the control means controls the moving means such that the lens moves relative to the object in a second direction opposite from the first direction (controller 127 controls stage controller 115, which results in movement in direction opposite from first direction; para. [0145]).

24. In claims 15 and 19, Fukuyo teaches the lens is held at the measurement initial position between a position corresponding to one end of the line to cut and a position corresponding to a position on the outside of the one end on an extension of the line to cut, and between a position corresponding to the other end of the line to cut and a position corresponding to a position on the

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outside of the other end on the extension of the line to cut. (i.e., amount of movement object to be processed in z-axis direction determined, S101; Fig. 15).

25. In claim 16, Fukuyo teaches the processing step comprises: a processing preparatory step of setting a processing initial position for holding the lens with respect to the main surface according to the displacement of the main surface along the line to cut acquired by the displacement acquiring step, and holding the lens at thus set processing initial position (S103, Fig. 15); a first processing step of starting emitting the first laser beam while holding the lens at the processing initial position, and moving the lens and the object relative to each other so as to form the modified region in the one end part of the line to cut (S109, Fig. 15); and a second processing step of releasing the lens from being held at the processing initial position after forming the modified region in the one end part of the line to cut, and moving the lens and the object relative to each other after the release while adjusting the gap between the lens and the main surface according to the displacement of the main surface along the line to cut acquired in the displacement acquiring step (S111, Fig. 15), so as to form the modified region (S113, Fig. 15).

26. Regarding claims 1-6, 8-13, 15-16, 19-20, Fukuyo teaches the use of a second light for measuring a displacement of a main surface of the object while converging the second light with the lens. However, Fukuyo does not teach that the second light comprises a laser light source.

27. Kurosawa teaches a laser machining system with control based on machining state recognition that uses a laser light source and a photodetector to measure the amount of reflected light (see col. 4, ln. 45-65).

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28. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Fukuyo to include the feature of Kurosawa, since the laser light source provides for a more accurate and easily controlled light source than the observation light source taught in Fukuyo.

29. Regarding claims 7, 14, 17-18, 21-22, Fukuyo in view of Kurosawa teaches all the features described above, but does not explicitly teach a second line to be cut or the steps of acquiring the displacement along a second line to be cut. However, Fukuyo does describe forming a second modified region along which a second line is intended to be cut. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Fukuyo to include a second line to be cut, since this only involves a routine repetition of the process taught by Fukuyo.

Double Patenting

30. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225

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USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

31.

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

32. Claims 1-22 provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-14 of copending Application No. 10/585,343, claims 1-18 of copending Application No. 10/585,660. Although the conflicting claims are not identical, they are not patentably distinct from each other because all describe a laser processing method which relies on measuring displacement measured with a second laser beam and a laser processing apparatus with a lens, displacement acquiring means, moving means, holding means, and control means.

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This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Conclusion

33. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: US Patent No. 5038016; US Patent No. 5698120; US Patent No. 6407360 B1; US PGPub. No. 20020125232; US PGPub. No. 20020140949.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JOHN WASAFF whose telephone number is (571)270-1283. The examiner can normally be reached on Monday through Friday, 7:30am to 5:00pm, alternating Fridays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tu Hoang can be reached on (571)272-4780. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/JOHN WASAFF/

Examiner, Art Unit 3742

07/29/10

/TU B HOANG/

Supervisory Patent Examiner, Art Unit 3742